

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION**

CYWEE GROUP LTD.,

*Plaintiff,*

v.

HUAWEI DEVICE CO. LTD.,  
HUAWEI DEVICE (DONGGUAN)  
CO. LTD., AND HUAWEI DEVICE  
USA, INC.,

*Defendants.*

CASE NO. 2:17-cv-00495-RWS-RSP

JURY TRIAL DEMANDED

**PLAINTIFF CYWEE GROUP LTD'S OPENING CLAIM CONSTRUCTION BRIEF**

Michael W. Shore  
Texas State Bar No. 18294915  
mshore@shorechan.com  
Alfonso Garcia Chan  
Texas State Bar No. 24012408  
achan@shorechan.com  
Christopher L. Evans  
Texas State Bar No. 24058901  
cevans@shorechan.com  
Ari B. Rafilson  
Texas State Bar No. 24060456  
arafilson@shorechan.com  
William D. Ellerman  
Texas State Bar No. 24007151  
wellerman@shorechan.com  
Paul T. Beeler  
Texas State Bar No. 24095432  
pbeeler@shorechan.com

SHORE CHAN DEPUMPO LLP  
901 Main Street, Suite 3300  
Dallas, Texas 75202  
Tel: (214) 593-9110  
Fax: (214) 593-9111

Attorneys for Plaintiff CyWee Group Ltd.

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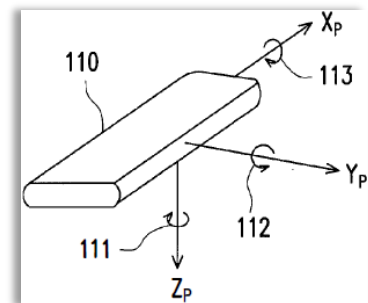
<b>EXHIBIT</b>	<b>DESCRIPTION</b>
A	U.S. Patent No. 8,441,438
B	U.S. Patent No. 8,552,978
C	Bates-labeled excerpt from Nouredin et. al al., Fundamentals of Inertial Navigation, Satellite-based Positioning and their Integration, Springer-Verlag Berlin, Heidelberg, 2013 (CYWEE_HUAWEI026784-827).
D	Bates-labeled version of Janis Wojtusich, HuMOD – A versatile and open database for the investigation, modeling and simulation of human motion dynamics on actuation level, Proceedings of the IEEE-RAS International Conference on Humanoid Robots (Humanoids), 2015, Seoul (CYWEE_HUAWEI026777-783).
E	Bates labeled version of Phil Cheetham, Aligning the Sensors to the Golfer before Analysis (2015), available at <a href="https://www.philcheetham.com/aligning-the-sensors-to-the-golfer/">https://www.philcheetham.com/aligning-the-sensors-to-the-golfer/</a> (CYWEE_HUAWEI027312-316).

Plaintiff, CyWee Group Ltd. (“CyWee”), submits its opening claim construction brief which includes proper constructions and related argument for the disputed terms of U.S. Patent No. 8,441,438 (“the ’438 patent”) and U.S. Patent No. 8,552,978 (“the ’978 patent”).

## I. GENERAL TECHNICAL BACKGROUND

The ’438 and ’978 patents describe and claim inventions that have revolutionized the ways in which people interact with handheld devices, including smartphones. The patents claim a “three-dimensional pointing device” capable of fusing sensor data and compensating for accumulated errors in order to accurately track the device’s orientation in 3D space. *See, e.g.*, ’438 patent 1:17-26; ’978 patent 1:22-27. CyWee’s inventions allow devices, such as Huawei’s smartphones, to track their orientation and then seamlessly transform a movement pattern to an external display, or on the display of the portable electronic device itself. *See id.* 1:17-52, 3:52-57, Figs. 5, 6; ’978 patent 1:22-27, 7:5-18. This technology makes today’s navigation, gaming, and augmented reality applications possible, and it is one of the key features that drives smartphone sales.

The claimed 3D pointing device works by “fusing” data from different motion sensors. Motion sensors detect and measure accelerations, rotations, or magnetisms, which generate data representing movement, shaking, or tilting of a device along three perpendicular reference axes (X, Y, and Z) of a 3D space. For example, in the excerpt from Figure 1 shown on the right, yaw angle 111 represents rotation of pointing device 110 about the  $Z_P$  axis; pitch angle 112 represents rotation of pointing device 110 about the  $Y_P$  axis; and roll angle 113 represents the rotation of pointing device 110 about the  $X_P$  axis. ’438 patent 1:65 –2:2.



There are different types of motion sensors, including accelerometers, gyroscopes, and magnetometers. Accelerometers measure accelerations. Airbags use accelerometers, such that the airbag is triggered by sudden deceleration. Gyroscopes measure rotation rates or angular velocities. Magnetometers measure magnetisms, including the strength of a magnetic field along a particular direction. These different types of motion sensors typically provide measurements along a single direction. To accurately measure motions along an arbitrary axis, multiple sensors (i.e. three single-axis accelerometers) may be grouped together.

Each type of sensor is subject to inaccuracies. For example, a gyroscope has a small, added offset or bias, that may accumulate over time and lead to large drift error. Similarly, magnetometers are subject to interference from natural and manmade sources.

To incorporate data from multiple sensors and compensate for errors and noise, both patents disclose “sensor fusion” technology. The ’438 patent discloses an enhanced 6-axis sensor fusion technology for calculating orientation by using measurements from a 3-axis accelerometer and a 3-axis gyroscope; furthermore, the patented invention can eliminate or reduce errors associated with those sensors. ’438 patent 4:6-30. The ’978 patent discloses a similar 9-axis “enhanced” sensor fusion technology for calculating orientation and transforming the movement of the device to a display. ’978 patent 4:15-44. Unlike the ’438 patent, the ’978 patent requires a magnetometer. *Id.* Claim 1, 10.

Orientation information derived by the claimed inventions of the ’438 and ’978 patents has many uses, particularly for mobile cellular devices, such as navigation, gaming, and augmented/virtual reality applications.

## II. LEGAL STANDARDS

### A. Claim Construction

Claim construction is the first step in both patent infringement and invalidity analyses. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976-78 (Fed. Cir. 1995). As a result, “[i]t has been an inviolate rule that patent claims are construed the same way for validity and for infringement.” *Abbott Labs. v. Sandoz, Inc.*, 566 F.3d 1282, 1317 (Fed. Cir. 2009). Claim construction is a question of law that must be resolved by the Court. *Markman*, 52 F.3d at 979. Its purpose is to translate the claim language “into plain English so that a jury will understand.” *Control Res., Inc. v. Delta Elecs., Inc.*, 133 F. Supp. 2d 121, 127 (D. Mass. 2001). A claim term is generally given its plain and ordinary and customary meaning as the term would have been understood by a person of ordinary skill in the art at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005).

“Claim construction is not an obligatory exercise in redundancy” and “district courts are not (and should not be) required to construe every limitation present in a patent’s asserted claims.” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008). Rather, claim construction is necessary only in limited situations, such as where a patentee has provided an alternate definition for a term, where the patentee has disclaimed subject matter or highlighted a feature as important to the invention, or where the term makes the scope so unclear as to require further clarification. *W.E. Hall Co. v. Atlanta Corrugating, LLC*, 370 F.3d 1343, 1353 (Fed. Cir. 2004); *see also Image Processing Techs., LLC v. Samsung Elecs. Co.*, No. 2:16-CV-505, 2017 WL 2672616, at \*9 (E.D. Tex. June 21, 2017) (“The Court is not convinced that Defendant’s constructions are necessary or appropriate based on the intrinsic record.”).



The “intrinsic evidence of record, *i.e.*, the patent itself, including the claims, the specification and, if in evidence, the prosecution history,” is “the most significant source of the legally operative meaning of [the] disputed claim language.” *Vitronics Corp. v. Conceptiontronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). Claim construction always begins with the language of the claims themselves. *Id.* A construction that excludes a preferred embodiment from the scope of the claims is “rarely, if ever, correct.” *Vitronics*, 90 F.3d at 1583. Claims must be read in light of the specification because “a patentee may define his own terms, give a claim term a different meaning than the term would otherwise possess, or disclaim or disavow the claim scope.” *Fundamental Innovation Sys. Int’l LLC v. LG Elecs. Inc.*, No. 2:16-CV-1425-JRG-RSP, 2018 WL 1608566, at \*4 (E.D. Tex. Apr. 2, 2018) (citing *Phillips*, 415 F.3d at 1316).

If necessary to determine the meaning of a claim term, a court may also rely on extrinsic evidence, so long as such evidence is not used to “vary or contradict the terms of the claims.” *Markman*, 52 F.3d at 980. Such evidence “may be helpful to explain scientific principles, the meaning of technical terms, and terms of art . . . .” *Id.*

## **B. Indefiniteness**

Under 35 U.S.C. § 112 ¶ 2, a “patent is invalid for indefiniteness if its claims, read in light of the patent’s specification and prosecution history, fail to inform, with **reasonable certainty**, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2123 (2014) (emphasis added). Absolute certainty or precision is not required. *Id.* at 2128 (“Some modicum of uncertainty . . . is the price of ensuring the appropriate incentives for innovation.”). Thus, a “patentee need not define his invention with mathematical precision in order to comply with the definiteness requirement.” *Sonix Tech. Co. v. Publications Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017). An alleged infringer bears the burden of showing “by

clear and convincing evidence that a skilled artisan could not discern the boundaries of the claim based on the claim language, the specification, and the prosecution history, as well as her knowledge of the relevant art area.” *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1249-50 (Fed. Cir. 2008); *see also Effective Expl., LLC v. Bluestone Nat. Res. II, LLC*, No. 2:16-cv-00607-JRG-RSP, 2017 WL 3193322, at \*8 (E.D. Tex. July 27, 2017) (holding same).

### **C. The Samsung Claim Construction Order**

CyWee sued Samsung in this Court for infringing the same patents. *CyWee v. Samsung*, Case No. 2:17-cv-00140-WCB-RSP (the “Samsung Case”). The Court issued its claim construction order (the “Samsung Order”) in the Samsung Case on July 9, 2018. Samsung Case Dkt. 117. Because that order covers many of the same terms at issue here (and because in most instances Huawei proposes the same constructions that were rejected in the Samsung Case), the order should be dispositive, and CyWee proposes that the Court adopt the same constructions in this case.<sup>1</sup> Nevertheless, CyWee makes additional arguments in this brief that further support application of the Court’s rulings in the Samsung Case here.

## **III. TERMS ALLEGED INDEFINITE BY HUAWEI**

Huawei alleges that three terms are indefinite. The Court has already held that each of the terms is definite because they reasonably inform a person of ordinary skill in the art of the scope of the terms. Samsung Order at 14-17. Further, the Court did not construe any of the three terms, and CyWee agrees that these terms need not be construed.

### **A. “utilizing a comparison to compare the first signal set with the second signal set”**

<b>Claim</b>	<b>CyWee’s Construction</b>	<b>Huawei’s Construction</b>
1	This term need not be construed. In the alternative only, this term may be construed as: “determining or assessing differences based on a previous state	Indefinite

<sup>1</sup> The only disputed term in this case that was not construed in the Samsung Case is “signal set.”

Claim	CyWee's Construction	Huawei's Construction
	associated with the first signal set and a measured state associated with the second signal set while calculating deviation angles"	

### 1. Background and Legal Standard

CyWee proposed a construction for this term solely in response to Huawei's allegation that the term is indefinite. As this Court has held, it need not construe this term to reject Huawei's indefiniteness argument. *Gonzalez v. Infostream Grp., Inc.*, No. 2:14-CV-906-JRG-RSP, 2015 WL 5604448, at \*12 (E.D. Tex. Sept. 21, 2015) ("the Court rejects Defendants' indefiniteness argument and determines that the terms have their *plain and ordinary meaning* . . ."). Huawei cannot satisfy its burden of proving indefiniteness by clear and convincing evidence because a person of ordinary skill in the art would understand with reasonable certainty the scope of this term. *E.g.* Declaration of Joseph LaViola ("LaViola Dec.") ¶ 34.

To date, Huawei has wholly failed to provide its basis for alleging that this term is indefinite. Huawei refused to provide a declaration from its expert, Dr. Gregory Welch, along with the parties' Joint Claim Construction Statement, or at any time before its response is due. Dkt. 72 at 4 ("[A]ny declaration by Dr. Welch will occur *concurrent with* Huawei's claim construction brief . . .") (emphasis added).<sup>2</sup> As shown below, although Huawei purports to provide Dr. Welch's position in the Joint Statement, Huawei's "summary" merely states that Dr. Welch *may* opine on a number of topics, but provides no actual substance:

Specifically, the declaration *may* address the fact that the specification fails to disclose to one of ordinary skill in the art the scope of the claimed subject matter of claim 1 of the '438 patent. The declaration *may* address extrinsic evidence showing that this term lacks clear scope. . . .

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<sup>2</sup> CyWee filed a preliminary version of Dr. LaViola's declaration with the parties Joint Claim Construction and Prehearing Statement. Dkt. 72-2.

See Dkt. 72-1 at p. 6. Huawei made similarly specious allegations for the other terms it alleges are indefinite. CyWee is forced to guess as to the nature of Huawei's indefiniteness arguments.

## **2. CyWee's Construction is Consistent with the Claim Language, Specification, and the Understanding of a Person of Ordinary Skill in the Art**

In the event Huawei alleges that the claimed comparison is unclear, that is not the case. The Applicant acted as a lexicographer in stating that the term "comparison" has a special meaning: "The term of 'comparison' of the present invention may generally refer to the *calculating and obtaining of the actual deviation angles* of the 3D pointing device . . ." '438 patent 2:27-29 (emphasis added); see also *Baxter Healthcare Corp. v. Mylan Labs. Ltd.*, No. CV 14-7094 (JBS/JS), 2016 WL 1337279, at \*5 (D.N.J. Apr. 5, 2016) (listing Federal Circuit cases on lexicography). The patent repeatedly refers to this comparison as an "enhanced comparison method." *E.g., id.* 3:62-63, 4:31-42 ("the present invention provides an enhanced comparison method . . . by comparing signals of rotation sensor related to angular velocities or rates with the ones of accelerometer related to axial accelerations"), 4:53-59. Huawei cannot deny that the patent expressly teaches calculating and obtaining deviation angles using the first and second signal sets as required by this claim term. See '438 patent Figs. 7, 8. This requirement is echoed in CyWee's construction, which requires that the comparison occur "while calculating deviation angles."

Huawei cannot credibly argue that this term requires a *direct comparison* between the first and second signal sets. By way of background, a rotation sensor is used to detect and generate the *first signal set*, which comprises angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$ . '438 patent claim 1. An accelerometer is used to detect and generate the *second signal set*, which comprises axial accelerations  $A_x$ ,  $A_y$ , and  $A_z$ . *Id.* As this Court has held, the enhanced comparison method does not require an "apples-to-apples comparison" between the signal sets:

The patents acknowledge the methodology *does not invoke a precise apples-to-apples comparison and requires some conversion*. See, e.g., '438 Patent at 12:39–60 (providing “a data conversion utility to convert the angular velocities  $\omega_x$ ,  $\omega_y$ , and  $\omega_z$  into the second quaternion”); *id.* at 13:32–37 (noting “it is preferable to compare the second quaternion . . . with the measured axial accelerations  $A_x$ ,  $A_y$ ,  $A_z$ ”). . . . For this invention, that’s sufficient to be “meaningful.”

Samsung Order at 17 (emphasis added). Similarly, the Northern District of California rejected Apple’s argument that this very term was indefinite and required a direct comparison:

Defendant's position depends on an overly rigid construction of the term “signal sets” as “raw data from the signal sets.” That two measurements are made using different units does not make it “mathematically impossible” to compare those measurements: Celsius may be converted to Fahrenheit, kilometers may be converted to miles, and grams may be converted to cups. So long as the '438 Patent informs a person having ordinary skill in the art “with reasonable certainty” how to compare the signal sets, the claim term is not indefinite. And the Patent does so by explicitly defining “comparison” as the calculation of “deviation angles,” which calculation is described in further detail in the specification.

*Cywee Grp. Ltd v. Apple Inc.*, No. 14-CV-01853-HSG, 2015 WL 5258728, at \*4 (N.D. Cal. Sept. 9, 2015).

The patents-in-suit expressly teach conversion to a *common state*, which allows a comparison. LaViola Dec. ¶ 40. By way of background, Figure 7 teaches the use of three quaternions: (1) a 1st quaternion that represents the previous state (orientation at a previous time), (2) a 2nd quaternion that represents the current state (orientation at the current time), and (3) a 3rd quaternion, the represents the updated state. The previous state (1st quaternion) is initialized in Steps 705 710, and 740. '438 patent Fig. 7, 12:11-31. In Step 720, the current state (second quaternion) is generated based on the previous state (first quaternion) and *measured angular velocities (first signal set)*. *Id.* 12:32-60. In Step 730, predicted axial accelerations (predicted state) are generated based on the current state (second quaternion), which can be compared to the *measured axial accelerations (second signal set)* during the generation of the measured state. In other words, the predicted axial accelerations (which are based on the 1st

signal set) may readily be compared to measured axial accelerations (the second signal set). *E.g.*, Fig. 7. All of this occurs during the calculation of deviation angles as required by CyWee's construction.

Further, CyWee's construction is consistent with the understanding of a person of ordinary skill in the art. *E.g.* LaViola Dec. ¶ 37. As Dr. LaViola testifies, a "comparison" as used in mathematics, engineering, and computer science, generally refers to "determining or assessing differences" as required by CyWee's construction. *Id.* As Dr. LaViola also testifies, the comparison need not be between raw data. *Id.*

Huawei states that it intends to rely on declarations from various persons in the Samsung Case, including Samsung's expert, M. Ray Mercer. Dr. Mercer opined that this term was indefinite for the following three reasons: (1) the term "axial accelerations" could have multiple meanings, (2) it would be impossible to decompose different types of acceleration from an accelerometer, and (3) it is mathematically impossible to compare axial accelerations with angular velocities.

Regarding (1), the patent explicitly recognizes different types of acceleration, so there is no reason to believe that the patent is limited to a single type. Specifically, when discussing problems with prior art, the patent discusses:

limitations on known accelerometers that these sensors may not distinguish the gravitational acceleration from the acceleration of the forces including centrifugal forces or other types of additional accelerations imposed or exerted by the user.

'438 patent 3:1-15. The patent also states that an object of the patent is to eliminate or reduce accumulated errors and noises from conditions including "external gravity forces and additional extra accelerations." *Id.* 4:65-5:8. As this Court properly held, regardless of the type of acceleration, "at any instant the acceleration of the device can be represented by vectors along

with chosen reference frame. . . . The asserted patents are therefore not indefinite on this basis.” Samsung Order at 15.

Regarding (2), claim 1 does not require decomposing different types of acceleration, and, as discussed above, the patent readily acknowledges different types of acceleration. The Court has already held that this argument “is not an indefiniteness argument,” and therefore is not proper “in the context of claim construction.” Samsung Order at 15.

Regarding (3), as discussed previously and as the Court has already held, the patent teaches an enhanced comparison method, and does not require a direct comparison between axial accelerations and angular velocities.

Finally, as discussed previously, CyWee is completely unaware of Huawei’s specific grounds for claiming indefiniteness because Huawei has failed to provide any specificity or testimony at this time. CyWee is therefore limited to providing a substantive response to Huawei’s arguments and any proffered testimony in its reply brief.

**B. “comparing the second quaternion in relation to the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  of the current state at current time T with the measured axial accelerations  $A_x$ ,  $A_y$ ,  $A_z$  and the predicted axial accelerations  $A_x'$ ,  $A_y'$ ,  $A_z'$  also at current time T”**

Claims	CyWee’s Construction	Huawei’s Construction
14, 19	This term need not be construed. In the alternative only, this term may be construed as: “utilizing the second quaternion obtained from the measured angular velocities $\omega_x$ , $\omega_y$ , $\omega_z$ of the current state at current time T, the measured axial accelerations $A_x$ , $A_y$ , $A_z$ , and the predicted axial accelerations $A_x'$ , $A_y'$ , $A_z'$ also at current time T to obtain an updated state or updated quaternion.”	Indefinite

Although Huawei bears the burden of proof on indefiniteness, it again fails to provide any substantive disclosure of its position or any expert testimony suggesting that this term is indefinite. As confirmed by Dr. LaViola, this term is not indefinite because a person of ordinary

skill in the art would understand the scope of the term with reasonable certainty. *See* LaViola Dec. ¶¶ 72-93.

The Court properly held that this term is definite for at least the reasons cited in § I.A above. Samsung Order at 14-17. As with the previous term, this term recites a ***comparison***. The '438 patent describes an enhanced ***comparison*** method, and states that such a comparison may generally refer to calculating and obtaining deviation angles. '438 patent 2:27-29, 4:53-59. Figures 7 and 8 are flowcharts that illustrate a sensor fusion algorithm and enhanced comparison method such as that used in claims 14 and 19. LaViola Dec. ¶ 73. Figures 7 and 8 describe the use of three quaternions as part of the enhanced comparison method. Figures 7 and 8 illustrate an iterative process or loop in which the comparison method is repeated over time.

The 1st quaternion (shown in Figures 7 and 8) represents orientation at previous time T-1, which may be initialized the first time through the loop. '438 patent Fig. 7 Step 705, 11:62-64. On subsequent iterations of the loop, the 1st quaternion is sourced from an updated quaternion (the 3rd quaternion).

The ***second quaternion*** is computed using the ***angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  originating from the rotation sensor*** (comprising one or more gyroscopes) at current time T ('438 patent 7:64-65, 9:16-17, 12:32-38) and the first quaternion described above. This understanding is reflected in CyWee's construction, which recites "the second quaternion obtained from the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  of the current state at current time T" and is consistent with claims 14 and 19 themselves, which recite "the second quaternion in relation to the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  of the current state at current time T." The '438 patent further illustrates this step through the use of Equation 1, which is used to compute the second quaternion as shown as step 720 in Figures 7 and 8. LaViola Dec. ¶ 75; '438 patent 12:40-60 (describing Equation 1). The



measured axial accelerations  $A_x$ ,  $A_y$ ,  $A_z$  originate from the accelerometer or accelerometers at current time  $T$ . *Id.* Fig. 7 Step 725, 5:27-31; LaViola Dec. ¶ 76. The predicted axial accelerations are calculated at current time  $T$ . '438 patent Fig. 7 Step 730. Figures 7 and 8 disclose that the *second quaternion* (from Step 720), *measured axial accelerations* (from Step 725), and *predicted axial accelerations* (from step 730) are used to obtain an updated state or updated quaternion (referred to as a 3rd quaternion in Step 735). Similarly, this term requires “comparing the *second quaternion* . . . with the *measured axial accelerations* . . . and *predicted axial accelerations*. These components are included in CyWee’s construction.

As with the prior term, Huawei states that it intends to rely on testimony from Dr. Mercer for the same three reasons it alleges that the “utilizing a comparison . . .” term is indefinite. Each of these arguments is readily refuted in CyWee’s argument related to the preceding term and is further confirmed by Dr. LaViola. *See* LaViola Dec. ¶¶ 56-59.

Dr. Mercer further argued that the term “predicted axial acceleration” is ambiguous for the same reasons that “axial accelerations are ambiguous.” Thus, CyWee’s arguments for the prior term refuting Dr. Mercer’s testimony regarding “axial accelerations” apply equally here. Further, as Dr. LaViola testified, Equations 2-4 in the '438 and '978 patents describe an embodiment having a predicted axial acceleration, which is derived from the second quaternion (which is computed in Equation 1), and this quaternion is derived from the first quaternion and measured angular velocities (see Figs. 7 and 8 in both patents). LaViola Dec. ¶ 91. Because the predicted axial acceleration is derived from the second quaternion, and a POSITA would understand that the second quaternion is normalized so that it represents orientation, the predicted axial accelerations would represent (and only represent) accelerations that stem from gravity (since gravitational acceleration is used to determine orientation). *Id.* There is no ambiguity here.

**C. “generating the orientation output based on the first signal set, the second signal set and the rotation output or based on the first signal set and the second signal set”**

<b>Claim</b>	<b>CyWee’s Construction</b>	<b>Huawei’s Construction</b>
10	This term need not be construed. In the alternative, this term may be construed as follows: “generating the orientation output based on (1) the first signal set (from an accelerometer), the second signal set (from a magnetometer) and the rotation output (from a rotation sensor or gyroscope) or (2) the first signal set (from an accelerometer) and the second signal set (from a magnetometer)”	Indefinite

As with previous two terms, this Court has already held that the term is definite and need not be construed. Samsung Order at 14-17. Also, as with those terms, Huawei has failed thus far to provide a summary of its position. For this term, Huawei’s allegations of indefiniteness are particularly puzzling because the claim language itself is clear and unambiguous to a person of ordinary skill in the art, and even to a layperson. LaViola Dec. ¶¶ 99. The language of this term speaks for itself—the orientation output is based on (1) the first signal set, (2) the second signal set, and (3) the rotation output, or it is based on only (1) and (2). There is simply nothing here to construe, and the term need not be construed for the Court to hold that it is not indefinite.

*Gonzalez*, 2015 WL 5604448, at \*12.

CyWee’s alternative construction is consistent with the claim language and other intrinsic evidence, as well as the understanding of a person of ordinary skill in the art. LaViola Dec. ¶¶ 86-107. Specifically, CyWee’s construction requires a “first signal set (from an accelerometer)” consistent with claim 10’s requirement of “generating a first signal set comprising axial accelerations associated with movements and rotations of the 3D pointing device in the spatial reference frame.” CyWee’s construction further requires a “second signal set (from a magnetometer)” consistent with claim 10’s requirement of “generating a second signal set associated with Earth’s magnetism.” CyWee’s construction recites a “rotation output (from a

rotation sensor or gyroscope)” consistent with claim 10’s requirement of a “rotation output” as well as the patent’s teaching that a rotation sensor may include one or more gyroscopes. ’978 patent 5:57-61. A person of ordinary skill in the art would further understand that the terms “rotation sensor” and gyroscope are interchangeable, and the function of either is to measure angular velocities. LaViola Dec. ¶ 88.

As with other terms, Huawei stated that it may rely on testimony from Dr. Mercer from the Samsung Case. Dr. Mercer alleged that this term is indefinite for the following three reasons: (1) he alleged that the term “axial accelerations” is ambiguous, (2) he alleged that it is impossible to decompose different types of accelerations from a reading, and (3) he alleged that it is mathematically impossible to generate an orientation output using axial accelerations and magnetisms without being able to separate components of acceleration. Dr. Mercer’s first and second reasons are misguided for reasons discussed in §§ I.A.1 and I.A.2 herein. Specifically, Dr. Mercer’s testimony misses the point that the patents-in-suit readily acknowledge that there are different types of acceleration and not all are desirable. ’978 patent 3:14-19 (discussing limitations). The ’978 patent further teaches an enhanced comparison method for fusing data from multiple sensors over time to minimize errors and/or unwanted readings. *E.g., id.* 4:4-11 (“there is a need to provide an enhanced comparison method applicable to the processing of signals of motion sensors so that errors and/or noises . . . may be corrected or eliminated.”). Thus, the ability to decompose a given accelerometer reading is not necessary when using this enhanced comparison method. LaViola Dec. ¶¶ 60.

Regarding Dr. Mercer’s third reason, Dr. Mercer agreed that orientation may be calculated for a stationary device with data only from an accelerometer and a magnetometer using Equations 26-28 of the ’978 patent. Samsung Case Mercer Dec. Dkt. 67-1 ¶¶ 199, 214; *see also*

LaViola Dec. ¶ 111. Based on Equations 26-28, claim 10 reads on and covers a device that (1) calculates orientation based solely on an accelerometer and magnetometer when the device is stationary and (2) calculates orientation based on an accelerometer, gyroscope, and magnetometer when the device is moving. LaViola Dec. ¶ 111.

Further, as Dr. LaViola testified, the '978 patent and specifically Equations 5-11 particularly teach a nonlinear estimator that includes elements of an extended Kalman filter ("EKF"). LaViola Dec. ¶ 118-19. Dr. LaViola further testified that a person of ordinary skill in the art would understand that the teachings of the enhanced comparison method of the '978 patent, including Equations 5-11, provide a blueprint through which orientation can be determined for a moving object by fusing data from an accelerometer and magnetometer, without a gyroscope. *Id.* For at least these reasons, this term is not indefinite. Indeed, the specification expressly teaches that "in order calculate the resulting deviation, the computing processor 348 may utilize a comparison or algorithm to eliminate accumulated errors of the first, second and/or third signal sets of the nine-axis motion sensor module 302 . . . ." '978 patent 10:64-67, 11:1.

#### IV. ADDITIONAL TERMS

##### A. "six-axis motion sensor module"

Claims	CyWee's Construction	Huawei's Construction
'438 patent, claims 1, 3, 4, 5, 14, 15, 16, 17, 19	This term need not be construed. In the alternative only, this term may be construed as: "a collection of components comprising a rotation sensor comprising one or more gyroscopes for collectively generating three angular velocities and one or more accelerometers for collectively generating three axial accelerations where said gyroscope(s) and accelerometer(s) are mounted on a common PCB"	"a module consisting of: (i) a rotation sensor and (ii) one or more accelerometers, said module not having and using measured magnetisms and predicted magnetisms"

In the Samsung Case, the Court held that this term need not be construed. Samsung Order at 10. This term need not be construed because its meaning would be readily understood by a person of ordinary skill in the art. *See* LaViola Dec. ¶¶ 20, 28; *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) (a court need not construe every claim term). Prior to the Samsung Order, CyWee proposed an alternative construction simply to make clear that the term is open-ended and to refute Huawei's suggestion that the term should be construed in an overly narrow and restrictive manner. Because the Court has already considered and rejected such a construction (as proposed by Samsung), the same result should follow here. As the Court held in the Samsung Case, the term "six-axis motion sensor module" is **not** "limited to a device that only measures three angular velocities and three axial accelerations" and "nothing in the patent suggests 'six-axis' cannot mean 'at least six axes.'" Samsung Order at 9.

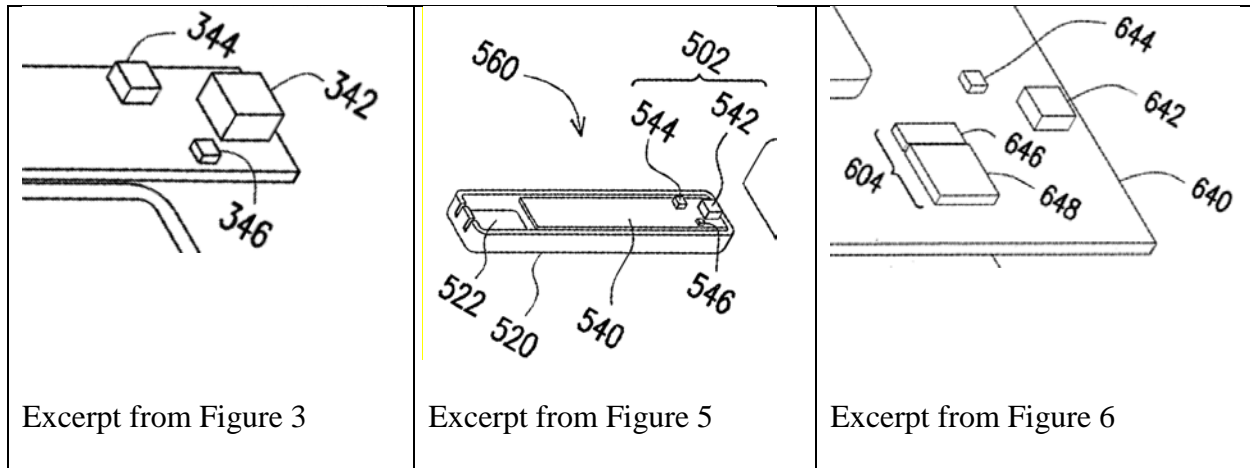
Huawei's proposed construction is contrary to the Court's reasoning because it would allow for a motion sensor consisting of two types of sensors, **and nothing more**. Claim 1 explicitly requires a "six axis motion sensor module . . . **comprising** a rotation sensor . . . [and] an accelerometer . . ." (emphasis added). It is well-settled that the term "comprising" is open-ended and allows for the inclusion of additional elements. *CIAS, Inc. v. All. Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007); *CollegeNet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 1235 (Fed. Cir. 2005). In contrast, Huawei's proposed "consisting of" language is close-ended and would allow only the elements explicitly listed and no more. *CIAS*, 504 F.3d at 1361. The patentee's choice of the term "comprising" in the phrase "a six-axis motion sensor module . . . comprising" clearly describes a six-axis motion sensor that may include any number of additional components, such as processors or additional sensors. This reading is confirmed by the Abstract which describes "a six-axis motion sensor module **including** a rotation sensor and an

accelerometer.” (emphasis added). See *Lucent Techs., Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1214 (Fed. Cir. 2008) (categorizing “including” as open-ended like “comprising”). The specification also repeatedly uses open-ended phrases such as “comprises” or “includes” when describing a six-axis motion sensor. *E.g.*, *id.* 5:18-23 (“the six-axis motion sensor module **comprises** a rotation sensor . . . and an accelerometer . . .”), 10:24-25. The ’438 patent also discloses a combination of motion sensors **including** accelerometers and gyroscopes:

[T]he present invention provides an enhanced comparison method to eliminate the accumulated errors as well as noises over time associated with signals generated by a **combination of motion sensors, including** the ones generated by accelerometers Ax, Ay, Az and the ones generated by gyroscopes  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  in dynamic environments.

*Id.* 4:20-26 (emphases added). This disclosure plainly allows for the presence of any number of components in addition to the requisite accelerometers and gyroscopes. Huawei’s overly restrictive and close-ended construction is improper, and the Court should disregard it as it did Samsung’s.

Similarly, Huawei’s inclusion of the term “module” in its proposed construction is misleading and would likely to lead to confusion because it implies that the accelerometer[s] and rotation sensor cannot be separate or separated, but rather must be tightly integrated within a single unit. But such a construction, which excludes a preferred embodiment is rarely, if ever, correct. *Vitronics*, 90 F.3d at 1583. Of the figures in the patent, only Figures 3, 5, and 6 show components for a six-axis motion sensor as used in the present invention, and each figure is consistent with CyWee’s proposed construction:



As is readily apparent, each embodiment depicts an accelerometer and gyroscope as *separate* components, separated by space on a common PCB, which clearly includes additional components. Figure 3 includes a “rotation sensor **342**” and an “accelerometer **344**.” ’438 patent 7:47-48. Figure 5 includes “six-axis motion sensor module 502 comprising the rotation sensor **542** and an accelerometer **544**.” *Id.* 9:13-14. And Figure 6 includes “rotation sensor **642**” and “accelerometer **644**.” *Id.* The accelerometers and gyroscopes in these figures are clearly shown as being separate components contained on a circuit board which also includes additional components. Huawei’s inclusion of the term “module” could be read to improperly exclude each of these embodiments.

Huawei’s proposed construction is also flawed insofar as it would exclude a six-axis motion sensor from “having and using measured magnetisms and predicted magnetisms.” As discussed above, and as the Court has already held, the ’438 patent does not limit the number or type of motion sensors or other components that may be included in a six-axis motion sensor. While Huawei’s basis for excluding a magnetometer in its proposed construction is unclear, it cites portions of the file wrapper for the ’978 patent (namely CYWEE\_HUAWEI000235-236 and CYWEE\_HUAWEI000202-16), presumably in an attempt to argue a disavowal of the ’438 patent’s scope. But as the Court has already held, the ’978 patent’s file wrapper, which merely

points out the differences between the two patents' claims "is not the 'clear and unmistakable disavowal' required to narrow the meaning of claim language." Samsung Order at 10 (citations omitted). Huawei's attempt to limit the scope of the '438 patent should be disregarded, and the Court need not construe this term.

#### B. "signal set"

Claim	CyWee's Construction	Huawei's Construction
'438 patent, claim 1; '978 patent claim 10	This term has its plain and ordinary meaning and need not be construed.	"a sensor's x-axis measurement, y-axis measurement, and z-axis measurement"

This term need not be construed because its meaning would be understood by a person of ordinary skill in the art. *See* LaViola Dec. ¶¶ 30, 33; *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) (a court need not construe every claim term). Because plain and ordinary meaning is the only meaning that can be ascribed to this term, CyWee offers no alternative construction. Huawei, however, proposes to define the term as "a sensor's x-axis measurement, y-axis measurement, and z-axis measurement."

Huawei's proposal is completely unnecessary, and it is contrary to the patents' claims. As Dr. LaViola notes, Claim 1 of the '438 patent already recites a "a first signal set comprising angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$ " and "a second signal set comprising axial accelerations  $A_x$ ,  $A_y$ ,  $A_z$ ." LaViola Dec. ¶ 31. Thus, the recitations of the claim **already require** that the term "signal set," as used in that claim, include three values as suggested by Huawei's construction. On the other hand, Claim 10 of the '978 Patent **does not** require that the first and second signal sets include three values. Instead, it requires a "first signal set comprising axial accelerations" and a "second signal set associated with Earth's magnetism." Thus, adopting the term's plain and ordinary meaning is the only way to ensure accurate and uniform interpretation of the term in this case.



Furthermore, as described previously, the claim terms at issue use the word “comprising,” which is open-ended and allows the “signal sets” to contain additional information beyond Huawei’s restrictive interpretation. The danger of Huawei’s proposed construction is readily apparent with respect to the term “utilizing a comparison to compare the first signal set with the second signal set,” insofar as it could be read to require a *direct* comparison of those signal sets when no such comparison is required. As discussed previously, this Court already rejected such an interpretation in the Samsung Case. Samsung Order at 17. Moreover, such a construction was expressly rejected by the Northern District of California in the *CyWee v. Apple* case.

Finally, as Dr. LaViola confirms, a “signal set” is a well-known term of art that simply means a set or collection of data or signals. LaViola Dec. ¶ 30 (citations omitted). Huawei cites no extrinsic evidence that would support its overly-restrictive definition of the term. Construction of this term is completely unnecessary.

### C. “global reference frame associated with Earth”

Claim	CyWee’s Construction	Huawei’s Construction
'978 patent, claim 10	This term need not be construed. In the alternative, this term may be construed as: “reference frame with axes defined with respect to the Earth”	“reference frame [subject to construction] with an origin at a fixed point on Earth”

CyWee previously proposed in this case that this term be construed as “reference frame with axes defined and fixed with respect to the Earth.” The Court has already construed this term in the Samsung Case to nearly the same construction: “reference frame with axes defined with respect to Earth” and CyWee agrees, for consistency, that construction is appropriate in this case.

Huawei’s overly-narrow construction should be rejected because it defies the commonly understood meaning of the term “global reference frame” and ignores broad language requiring only that the frame is “*associated with* Earth.”

The term “global reference frame” or “global frame of reference” is a commonly used term of art, which refers to a fixed frame, against which the position and orientation of moving frames can be measured. LaViola Dec. ¶ 123.

Huawei’s construction is overly narrow because of its requirement that the origin be “at a fixed point *on Earth*.” Huawei’s construction could be read to require that the origin be on the *surface* of the Earth. The term itself uses broader language and requires merely that the global reference frame is “*associated with the earth*.” As this Court has already held:

[T]here’s no technical reason why the claimed invention would require any reference frame to have a specific origin given the ease with which a point in one frame can be mapped to another frame. Indeed, the ’978 Patent’s use of “frame associated with” throughout the specification shows the location of the reference frame’s origin is not important.

Samsung Order at 12.

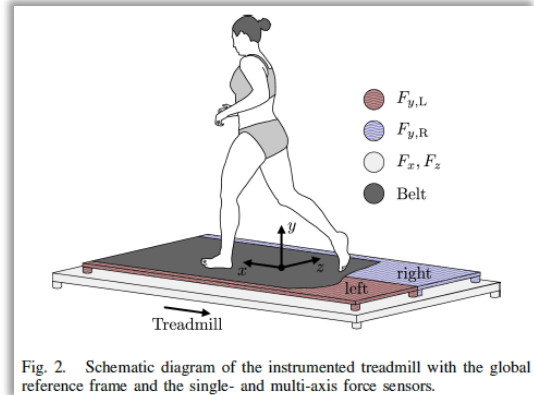
Huawei’s construction would improperly exclude reference frames having an origin at or near the *center of the Earth*. Such a frame is commonly known as an Earth-centered coordinate system. LaViola Dec. ¶ 124; *See also* Ex. C (“Noureldin”). Noureldin describes several such Earth-centered frames. An Earth-Centered Inertial Frame has its origin at the center of the Earth, the z-axis oriented through the North Pole, and the x-axis oriented through the equator and fixed with respect to an astronomical body such as the sun on a particular date and time. Noureldin § 2.2.1. An Earth-Centered Fixed Frame has its origin at the center of the Earth, the z-axis passes through the North Pole, and the x-axis is passes through the equator at a specific longitude, such as 0° (the Prime Meridian in Greenwich, UK). *Id.* § 2.2.2.

Huawei’s construction would further exclude other reference frames such as the North-East-Down (NED) or East-North-Up (ENU) reference frames, which need not have their origin on the surface of the Earth. For the ENU frame, the origin coincides with the center of the sensor frame,

and its axes are aligned with the East, North, and up directions. Noureldin § 2.2.3. The similar North-East-Down frame has axis aligned with the East, North, and up directions. *Id.*

Additional references confirm that a global reference frame, as the term is commonly used, need not have an origin *on the Earth*, and could, for example, be set near the surface. One reference describes a global reference frame with

an origin at the center of a treadmill: “Figure 2 illustrates the applied *global reference frame* where the origin is located at the center of the rectangle spanned by the left and right force plates projected to the top of the belt surface.”



Ex. D (Wojtusich). Thus, two of the axes run

along the surface of the Earth but not on it. Yet another reference describes a global reference frame with an origin located *behind* a golfer where said reference frame is not on the surface of the Earth. Ex. E (Cheetham). Huawei’s attempt to require an origin on the Earth is unjustified, and the patent itself has no disclaimer or disavowal justifying such a narrow read. *See*

*Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1306 (Fed. Cir. 2011)

(“Nothing in the claim language indicates that the claims exclude ‘cutting’ as a matter of law. To disavow claim scope, the specification must contain ‘*expressions of manifest exclusion or restriction*, representing a *clear disavowal* of claim scope.’”) (emphases added).

**D. “using the orientation output and the rotation output to generate a transformed output associated with a fixed reference frame associated with a display device”**

<b>Claims</b>	<b>CyWee’s Construction</b>	<b>Huawei’s Construction</b>
’978 patent, claim 10	“using the orientation output and rotation output to generate a transformed output representing a movement in a fixed reference frame that is parallel to the screen of the display device.”	“using the orientation output and the rotation output to generate a transformed output <b>representing a</b> two-dimensional movement in a fixed reference frame that is parallel to the screen of the display device”

With respect to this term, the parties’ prior competing constructions are identical to those proffered by the parties in the Samsung Case. But in that case, the Court adopted neither proposed construction, and instead construed this term as “using the orientation output and rotation output to generate a transformed output representing a movement in a fixed reference frame that is parallel to the screen of the display device.” Samsung Order at 14. CyWee submits that the Court should adopt the same construction here and therefore will focus on the reasons why Huawei’s construction (like Samsung’s) is incorrect.

It is undisputed, (and the Court has acknowledged) that the intrinsic evidence confirms that the transformed output represents **movement**. For example, Figure 8 discloses an embodiment of a 3D pointing device that “translate[s] the resultant angles to **movement pattern** in the display reference frame.” (emphasis added). Figure 6 discloses an embodiment in which the pointing device and display are integrated. In this embodiment, the computing processor may map the resulting deviation to a **movement pattern**.

The computing processor 648 of the processing and transmitting module 604 **may too perform the mapping of resultant deviation** from or in said spatial reference frame or 3D reference frame to a display reference frame such as a 2D reference frame by translating the resultant angles of the resulting deviation of the electronic device 600 in the spatial reference frame, preferably about each of three orthogonal coordinate axes of the spatial reference frame **to a movement pattern in a display reference frame** associated with the electronic device 600 itself. **The display 682 displays the aforementioned movement pattern.**

'978 patent 13:48-59.

Huawei's construction would improperly require that the transformed output represent only a two-dimensional movement. However, In the Samsung Case, the Court accurately construed the term as requiring that the transformed output represent "***a movement.***" (Samsung Case Dkt. 117 at 14). Adopting the same construction here would correctly reject Huawei's overly narrow construction, which suggests that the transformed output cannot represent three-dimensional movement. In support of its construction, CyWee expects Huawei (like Samsung) to rely on a single embodiment in which "[t]he transformed output  $\langle d_x, d_y \rangle$  ***represents a*** 2-dimensional movement in a display plane . . . ." '978 patent 31:58-65 (emphasis added). In that embodiment, the pointer and pointing device are separate. *See id.* As the Court concluded, applying this limitation to ***all embodiments*** is improper and contrary to the teachings of the '978 patent: "there's no reason the claim scope should be limited to representing only two-dimensional movement given that the passage on which Defendants rely only relates to a particular embodiment." Samsung Order at 13 (citing *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) ("Even when the specification describes only a single embodiment, the claims . . . will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using 'words or expressions of manifest exclusion or restriction.'")).

Huawei's construction is contrary to the '978 patent itself, which teaches tracking of movement in three dimensions rather than two dimensions. For example, claim 10 requires a 9-axis motion sensor, and teaches the use of an accelerometer, gyroscope, and magnetometer, each having the capability of providing 3-axis (rather than 2-axis) output. Thus, any representation of that movement on a 2-dimensional screen (such as the screens disclosed in Figures 2 and 6) is a 2-dimensional representation of movement, which may occur in three dimensions. Unlike the

embodiment described in the previous paragraph which requires a separate pointing device and display, Figure 6 shows an embodiment in which the 3D pointing device and screen are combined into a single device. The description of this embodiment explicitly states that the display may show a movement pattern associated with 3D movement (about three axes, not two):

[t]he computing processor . . . may too perform the mapping of resultant deviation . . . to a display reference frame such as a 3D reference frame by translating the resultant angles of the resulting deviation of the electronic device . . . preferably about each of *three orthogonal coordinate axes* of the spatial reference frame to a movement pattern in a display reference frame associated with the electronic device **600** itself. The display **682** displays the aforementioned movement pattern.

'978 patent 13:48-58. (emphases added). Huawei's construction could be read to exclude this embodiment in violation of well-established law holding that a construction that excludes a preferred embodiment from the scope of the claims is "rarely, if ever, correct." *Vitronics*, 90 F.3d at 1583.

The patent includes other broad disclosures regarding the scope of the transformed output. For example, the Abstract states "The computing processor uses the orientation output and the rotation output to generate a transformed output associated with a fixed reference frame associated with the display device. *The transformed output represents a segment of the movement pattern.*" (emphasis added). In one embodiment, "the orientation output and the rotation output" are used "to generate a *transformed output associated with a fixed reference frame associated with a display device.*" *Id.* 8:10-12. Yet another embodiment discloses that "based on the deviation angles being compensated and accurately outputted in a *3D spatial reference frame* may be further *mapped onto* or translated into another reference frame, for example *a reference in two-dimension (2D).*" *Id.* 43-45. In other words, in this embodiment, 3D movement is translated to 2D output. This embodiment does not require that such output solely represents 2D movement, as Huawei's construction requires.

Huawei's reliance on a single embodiment to narrow the scope of claim 10 violates well-established Federal Circuit precedent holding that disclaimer or disavowal of subject matter must be clear. *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1306 (Fed. Cir. 2011) ("Nothing in the claim language indicates that the claims exclude 'cutting' as a matter of law. To disavow claim scope, the specification must contain '*expressions of manifest exclusion or restriction*, representing a *clear disavowal* of claim scope.'"). The Court rejected the same argument in the Samsung Case, and it should do so here. CyWee respectfully requests that the Court reject Huawei's overly-narrow construction of this term and construe it in the same manner as in the Samsung Case.

## V. CONCLUSION

For the reasons stated herein, CyWee respectfully requests that the Court adopt its constructions and rulings from the Samsung Case., and further hold that the term "signal set" need not be construed.

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Respectfully submitted,

/s/ Ari Rafilson

Michael W. Shore

Texas State Bar No. 18294915

mshore@shorechan.com

Alfonso Garcia Chan

Texas State Bar No. 24012408

achan@shorechan.com

Christopher L. Evans

Texas State Bar No. 24058901

cevans@shorechan.com

Ari B. Rafilson

Texas State Bar No. 24060456

arafilson@shorechan.com

William D. Ellerman

Texas State Bar No. 24007151

wellerman@shorechan.com

Paul T. Beeler

Texas State Bar No. 24095432

pbeeler@shorechan.com

SHORE CHAN DEPUMPO LLP

901 Main Street, Suite 3300

Dallas, Texas 75202

Tel: (214) 593-9110

Fax: (214) 593-9111

Attorneys for Plaintiff

CyWee Group Ltd.

**CERTIFICATE OF SERVICE**

The undersigned certifies that all counsel of record who are deemed to have consented to electronic service are being served with a copy of this document via the Court's CM/ECF system per Local Rule CV-5(a)(3) on July 12, 2018

/s/ Ari Rafilson

Ari Rafilson